

ABSTRACT

In-Space Engine (ISE-100) Development – Design Verification Test

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In the past decade, NASA has formulated science mission concepts with an anticipation of landing spacecraft on the lunar surface, meteoroids, and other planets. Advancing thruster technology for spacecraft propulsion systems has been considered for maximizing science payload. Starting in 2010, development of In-Space Engine (designated as ISE-100) has been carried out.

ISE-100 thruster is designed based on heritage Missile Defense Agency (MDA) technology aimed for a lightweight and efficient system in terms volume and packaging. It runs with a hypergolic bi-propellant system: MON-25 (nitrogen tetroxide, N_2O_4 , with 25% of nitric oxide, NO) and MMH (monomethylhydrazine, CH_6N_2) for NASA spacecraft applications. The utilization of this propellant system will provide a propulsion system capable of operating at wide range of temperatures, from 50 °C (122 °F) down to –30 °C (–22 °F) to drastically reduce heater power. The thruster is designed to deliver 100 lb_f of thrust with the capability of a pulse mode operation for a wide range of mission duty cycles (MDCs).

Two thrusters were fabricated. As part of the engine development, this test campaign is dedicated for the design verification of the thruster. This presentation will report the efforts of the design verification hot-fire test program of the ISE-100 thruster in collaboration between NASA Marshall Space Flight Center (MSFC) and Aerojet Rocketdyne (AR) test teams. The hot-fire tests were conducted at Advance Mobile Propulsion Test (AMPT) facility in Durango, Colorado, from May 13 to June 10, 2016. This presentation will also provide a summary of key points from the test results.